REC'D 03 JUN 2004
WIPO PCT

IB/2004/000812
Rec'd PCT/PTO 22 SEP 2005
10/551145

Sertifikaat

REPUBLIEK VAN SUID-AFRIKA

PATENT KANTOOR
DEPARTEMENT VAN HANDEL
EN NYWERHEID

Certificate

REPUBLIC OF SOUTH AFRICA

PATENT OFFICE
DEPARTMENT OF TRADE AND
INDUSTRY

Hiermee word gesertifiseer dat
This is to certify that

the documents annexed hereto are true copies of:

Application forms P.1 and P.2, provisional specification and drawings of South African Patent Application No. 2003/2368 as originally filed in the Republic of South Africa on 27 March 2003 in the name of CUMBERLEGE DOUGLAS JOHN;RUDOLPH MORNÉ for an invention entitled: " THE SWING ARM-TRACKER ".

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN COMPLIANCE WITH RULE 17.1(a) OR (b)

Geteken te **PRETORIA** in die Republiek van Suid-Afrika, hierdie 4th dag van **May 2004**
Signed at in the Republic of South Africa, this day of

.....
Registrar of Patents

BEST AVAILABLE COPY

G.P.-S. 019-0194

FORM P 2
(To be lodged in duplicate)

REPUBLIC OF SOUTH AFRICA — PATENTS ACT, 1978.

REGISTER OF PATENTS

Official application No.	Lodging date: Provisional	Acceptance date
21 2003/2368	22 2003 -03- 27	47
International classification	Lodging date: Complete	Granted date
51	23	

Full name(s) of applicant(s)/Patentee(s):

71 CUMBERLEGE Douglas John
~~Rupert~~
RUDOLPH Marne

Applicants substituted:	Date registered
71	

Assignee(s):	Date registered
71	

Full name(s) of inventor(s):

72 CUMBERLEGE Douglas John
RUDOLPH Marne

Priority claimed	Country	Number	Date
	33	31	32
	33	31	32
	33	31	32

Title of invention

54 THE SWING ARM-TRACKER

Address of applicant(s)/Patentee(s)

Address for service P O Box 10235 Linton Grange P.E 6015

74

Patent of addition No.	Date of any change	
61		
Fresh application based on	Date of any change	

P 015 (E)

G.P.-S. 019-0126

REPUBLIC OF SOUTH AFRICA

PATENTS ACT, 1978

APPLICATION FOR A PATENT AND ACKNOWLED

[Section 30 (1)—Regulation 22]

(See notes overleaf)

P0-32-E

REGISTRAR OF PATENTS DESIGNS TRADE MARKS AND COPYRIGHT

R50 2003 R5 R5

The grant of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate.

Official Application No.	
21 01	2003/2368

(i)

Applicant's or agent's reference

(ii)

71	Full name(s) of applicant(s)	RUDOLPH: MOLNE CUMBERLEGE: DOUGLAS JOHN.

(iii)

	Address(es) of applicant(s)	P. O BOX 10235 LINTON GRANGE PORT ELIZABETH 6015

(iv)

54	Title of invention	THE SWING - ARM TRACKER

(v)

	The applicant claims priority as set out on the accompanying form P 2.

(vi)

	This application is for a patent of addition to Patient Application No.		
21	01		

(vii)

	This application is a fresh application in terms of section 37 and based on Application No.		
21	01		

(viii)

	This application is accompanied by:	
✓	1.	A single copy of a provisional or two copies of a complete specification of 5 pages.
✓	2.	Drawings of 14 sheets.
	3.	Publication particulars and abstract (form P 8 in duplicate).
	4.	A copy of Figure.....of drawings (if any) for the abstract.
	5.	An assignment of invention.
	6.	Certified priority document(s) (state number).
	7.	Translation of the priority document(s).
	8.	An assignment of priority rights.
	9.	A copy of the form P 2 and the specification of S.A. Patent Application No. 21 01
✓	10.	A declaration and Power of Attorney on form P 3.
	11.	Request for ante-dating on form P 4.
	12.	Request for classification on form P 9.
	13.	

(ix)

74	Address for service:	P.O BOX 10235 LINTON GRANGE P.E 6015

Dated this 27 th day of MARCH 2003

Signature of applicant(s) or agent

REGISTRAR OF PATENTS, DESIGNS, TRADE MARKS AND COPYRIGHT

Received

Official date stamp

2003 -03- 27

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978
DECLARATION AND POWER OF ATTORNEY
(Section 30 - Regulation 8, 22(i)(c) and 33)

FORM P.3

PATENT APPLICATION NO		REF:	LODGING DATE	
01	2003/2368		22	2003-03-27

FULL NAME(S) OF APPLICANT(S)

CUM BERLEGE DOUGLAS JOHN
RUDOLPH MORNE

FULL NAME(S) OF INVENTOR(S)

CUM BERLEGE DOUGLAS JOHN
RUDOLPH MORNE

EARLIEST PRIORITY CLAIMED	COUNTRY		NUMBER		DATE	
	33		31		32	

NOTE: The country must be indicated by its International Abbreviation - see schedule 4 of the Regulations

TITLE OF INVENTION

THE SWING-ARM TRACKER

I/We DOUGLAS JOHN CUMBERLEGE MORNE RUDOLPH

hereby declare that :-

1. I/we am/are the applicant(s) mentioned above;
2. I/we have been authorized by the applicant(s) to make this declaration and have knowledge of the facts herein stated in the capacity of of the applicant(s);
3. the inventor(s) of the abovementioned invention is/are the person(s) named above ~~and the applicant(s) has/have acquired the right to apply by virtue of an assignment from the inventor(s)~~;
4. to the best of my/our knowledge and belief, if a patent is granted on the application, there will be no lawful ground for the revocation of the patent;
5. this is a convention application and the earliest application from which priority is claimed as set out above is the first application in a convention country in respect of the invention claimed in any of the claims; and
6. the partners and qualified staff of the firm of , patent attorneys, are authorised, jointly and severally, with powers of substitution and revocation, to represent the applicant(s) in this application and to be the address for service of the applicant(s) while the application is pending and after a patent has been granted on the application.

SIGNED AT PRETORIA THIS 27TH DAY OF MARCH 2003

SIGNATURE(S)
(no legalization necessary)

In the case of application in the name of a company, partnership or firm, give full names of signatory/signatories, delete paragraph 1, and enter capacity of each signatory in paragraph 2.
If the applicant is a natural person, delete paragraph 2.
If the right to apply is not by virtue of an assignment from the inventor(s), delete "an assignment from the inventor(s)" and give details of acquisition of right.
For non-convention applications, delete paragraph 5.

Form P6

REPUBLIC OF SOUTH AFRICA

PATENTS ACT, 1978

PROVISIONAL SPECIFICATION

(Section 30(1) - Regulation 27)

Official Application No.		
21	01	*2003/2368

Lodging Date	
22	2003 -03- 27

Full name(s) of applicant(s)
71 DEUMBERLEGE DOUGLAS JOHN RADOLPH MORNE

Full name(s) of inventors(s)
72 DEUMBERLEGE DOUGLAS JOHN RADOLPH MORNE

Title of invention
54 THE SWING ARM TRACTOR.

(RP42E)

PATENT APPLICATION; D.CUMBERLEGE – M. RUDOLPH

THE SWING - ARM TRACKER

This invention relates to Conveyor Belts that is utilized throughout the Mining and Engineering Industries.
The problems associated with Conveyor Belts are a well-known maintenance and safety hazard.
A tremendous amount of time and effort is spent on these Conveyor Belts in almost all the production facilities throughout the world.
Conveyor Belts is the most economical method of transporting material or goods between the various lines of any production facility internationally.
Incorrect conveyor belt maintenance causes damage to the Conveyor Belt and structure and loss of production time.
Spillage of the aggregate must be cleaned and cleared on a regular basis to prevent blockages of the complete system, which is all the result of Conveyor Belts that is out of alignment or completely out of track

Object of the invention

The main object of the invention is to develop and produce a cost-effective and simple tracking device for the different types of Conveyor Belts in operation.
The installation and maintenance will not be labour-intensive, and the replacement of new idler rollers must be done in minimum time.
Eliminating the temperamental and expensive Hydraulic and Pneumatic tracking systems that are currently used in the industry to align the various belts and materials.
The Mining Sector and Quarry and Stone operations, normally use rubber belts and Solid Woven P.V.C. Conveyor Belts.
Various grades of P.V.C and Mono-film Belt's are used in the food and packaging industries.
The textile and plastic industries use Electronic tracking devices to keep the material from drifting into the structure and sides of the machine.

Summary of the Invention

The Tapered Roller

A front view of the Tracker system is shown in (Fig.1). A swing-arm that is connected to a Pin and Bush system hangs down on either side of the Conveyor Structure. Each swing-arm can move forward and backward independently.
A normal return Idler Roller is fitted into slots on the Swing–Arm brackets.
The Idler Roller is covered in rubber and both ends are tapered. (Fig.4) In the event of the conveyor belt drifting to any given side, the Idler Roller will swing forward on that particular side and the skewed roller will correct the misalignment immediately. Once the

Conveyor Belt is steered back to the center of the Idler Roller, the Idler Roller will swing back to its original position.

The tracker will perform this task and corrective action continually whenever Conveyor Belt misalignment or drift occurs.
The length of the tapers on the Idler Roller can be altered according to the sensitivity that is needed on any particular Conveyor Belt. The degree of the taper can also be altered to accommodate the cupping of the return Conveyor belt as shown in fig. 1.
The convex shape of the Idler Roller can also be changed to a concave shape.

The Fixed Disk Roller
(Fig.2) shows the same Swing-arm tracker system, accept for the two fixed disks that are provided on both ends of the Idler Roller. The purpose of the fixed disk is to swing the Idler Roller in the desired forward motion on the side where the conveyor belt start's to drift. The increased friction on a particular fixed disk activates the idler roller in the skewed forward motion.
The Idler Roller will rotate in a perfect state of balance (equilibrium) when the drag or friction of the Conveyor Belt edges is equal on both sides of the fixed disk. The fixed disk can also have a bigger diameter than the Idler Roller.

The Taper Flange Roller
(FIG.2A) Taper flanges is mounted on both ends of the idler roller. This roller works on the same friction principle as previously explained.
When the edge of the conveyor belt touches the taper flange the idler roller is activated in a skewed forward motion, the conveyor belt misalignment is then rectified.
The taper flanges can be adjusted according to the width of the conveyor belt and the amount of belt drift that is required. The Half-Section in (Fig.2A) shows the internal parts of the idler roller and the taper flange.

The V-Return or Trough
(Fig.3) shows the swing-arm tracker system with a V-return roller configuration. Each roller rotates independently and the shaft's is connected in the center with a plate and bolt fixture. V-returns are used extensively throughout the Mining Industry.
The tapered roller (fig.1) and the fixed disk roller system (fig.2) can be implemented on the V-return or trough system. The tapers or the disk can be fitted on the outer-edges of the V-return configuration. This will activate the V-return tracker in the desired forward motion to correct belt misalignment.
Two or more rollers can be used to achieve the V or trough configuration.

Stub rollers with the Swing-arm system
(Fig.5 and 6) Stub rollers are mounted at a angle at a before the swing-arm system. When the belt starts drifting, the stub roller applies a downward pressure on the edge of the Conveyor belt on that particular side. This action activates and swings the Idler roller in the desired forward motion. The skewed Idler roller steers the Conveyor belt back to its center position.

Stub rollers mounted on the swing-arm system
A further dimension to the stub roller system is shown in (Fig.7). the stub roller is mounted on to a swing-arm that is formed in a L-shape formation.
Both the idler roller and the stub roller is mounted on the L-shaped swing-arm bracket.

(Fig.7) shows two methods that can be used to mount the stub rollers.
Example A
The stub roller is mounted perpendicular on the L-Shaped bracket to make contact with the edge of the belt.
The stub roller serves as a guide roller and forces the swing-arm system in a forward motion to correct conveyor belt misalignment.

(Fig.7)Example B
The stub roller is mounted on the L-shaped swing-arm bracket at a angle to intercept the edge of the conveyor belt.
Both systems A and B function on the basic principle as explained in (Fig.5 and 6).
The taper roller, fixed disk and V-return system can be incorporated into the idler roller that is mounted and hanging on the L-shape bracket. These systems can be used where fine and accurate Conveyor belt tracking is required.

The stub roller will always touch the oncoming conveyor belt first, as shown in (Fig.5), but this can be changed as the complete system can be fitted on the inside of the conveyor belt. The inside of the conveyor belt is always cleaner than the outside because the product is carried on the outside.

Universal adjustment is provided for the stub rollers to simplify the installation of the complete system.
Various materials can be used in the manufacture of the swing–arm tracker without deviating from the scope of this invention.

The Base and Cradle tracking system Fig.(8-9-10)
Fig.(10) A central pivot point (bush) is provided in the base of this tracking system. The cradle and center pin which is connected, is mounted to the base with the pin and bush system as shown in Fig.(8).

One of the advantages of he base and cradle tracking system is the upside-down working concept. When the conveyor belt is in motion the dirt and fine aggregate sticks to the underside of the conveyor belt, therefore the spillage can not touch the base and cradle assembly, including the center pin and bush.
All the conveyor belt tracking systems that are presently in operation throughout the world seizes on the center pin and bush as these units is fitted below the return side of the conveyor belt. The swivel action which is a critical technical integer of this tracking system must therefore be protected.
Fig.(8)
A front view of the complete assembly is shown in Fig.8. A rubber covered roller is fitted into the cradle. The cradle and roller can swivel forward and backward when belt misalignment occurs. A side view of the complete forward and backward motion is shown in fig. 9. The roller and cradle is generally wider than the width of the conveyor belt as shown in fig. 8.

Fig.(11-12-13)

Fig.11 shows another dimension to the base and cradle system. The center shaft is mounted inside a round pipe (cradle) with the pin and bush. The center shaft is fixed to the conveyor structure and the cradle can swivel on the center pin and bush Fig.12.
The hanger brackets are fixed to the round pipe and this complete unit forms the cradle.
A normal idler roller is fitted on the hanger brackets.

Fig.12 further shows the forward and backward tilting action that can be implemented on this unit during the installation of the tracking system. Angle B indicates the tilting action and movement of the center line. The tilting action enhances the sensitivity of the complete tracking system whenever it may be required.

Fig.13.shows the idler roller is mounted in front of the center line. Distance A indicates the off center mounting method for the idler roller that can be used to improve the alignment and stability of the complete tracking system. Distance A can be adjusted according to the sensitivity that is needed on any conveyor belt.
A rubber-covered idler roller with tapers on both ends works exceptionally well on this tracking system.
The conveyor belt can run on the inside or outside of the idler roller or the complete tracking system can be mounted upside down.
The tracking system is universal and can be adapted to the various conveyor belts including uni-directional and reversible conveyor belts.

As previously explained in the Swing-arm Tracker the working principle and tracking action of the base and cradle system is more or less the same, except for the central pin and bush that allows the cradle and idler roller to pivot in the center. The idler roller detects when the conveyor belt starts drifting to the left or right while in motion, and will immediately activate and steer the conveyor belt back to the center position.

Virtually all the idler rollers and stub rollers (fig. 1-7) can be fitted into or used with the base and cradle system. The various mounting procedures and bracket configurations can also be implemented into the base and cradle system.

The various belts being used throughout the world, run at different speeds and a wide variety of products and materials are transported. One tracking system cannot solve all the belt misalignment problems. Various combinations of this invention can be used to solve the specific conveyor belt problems.

003/2368

FIG. 1

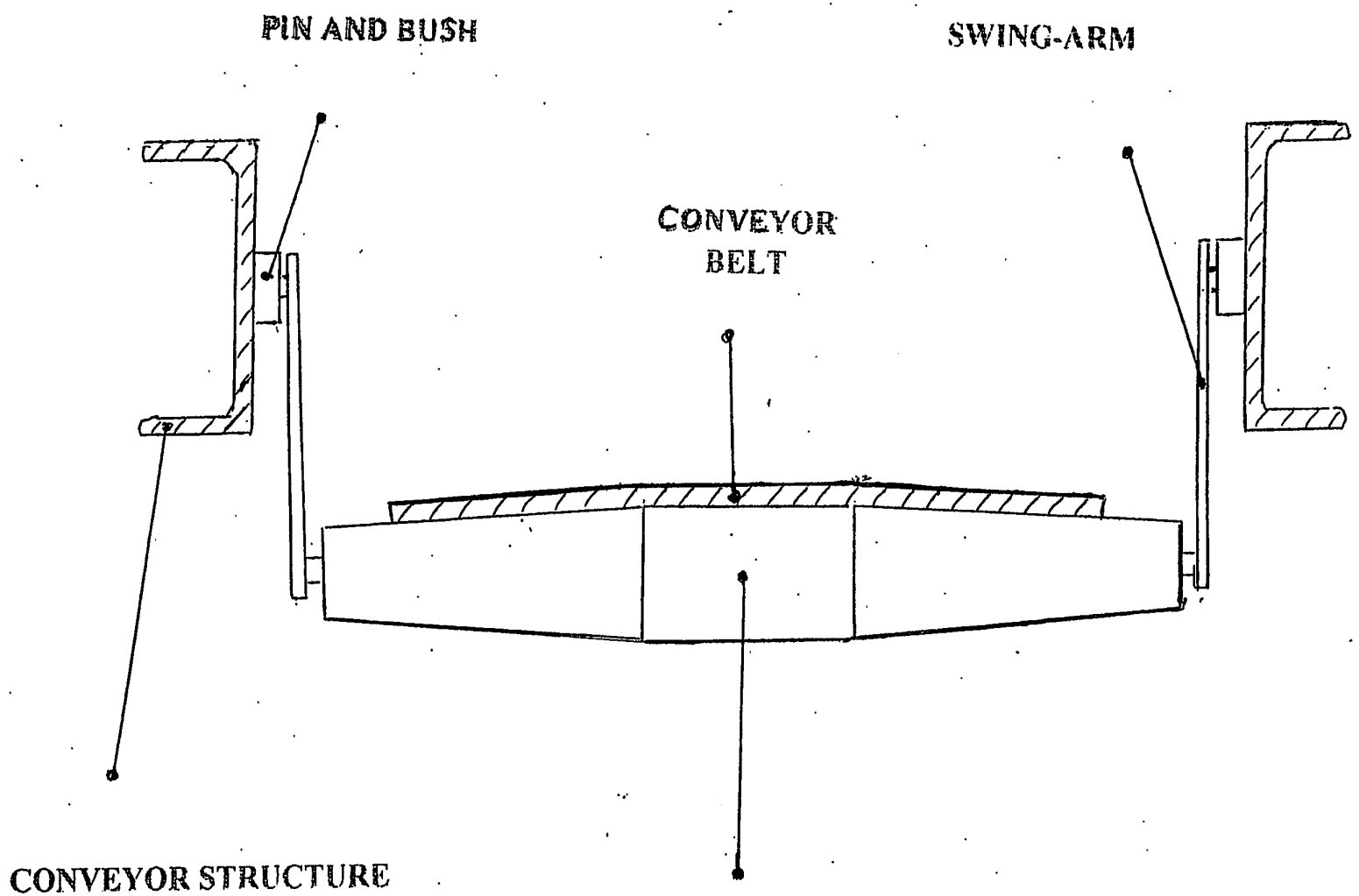


FIG. 2

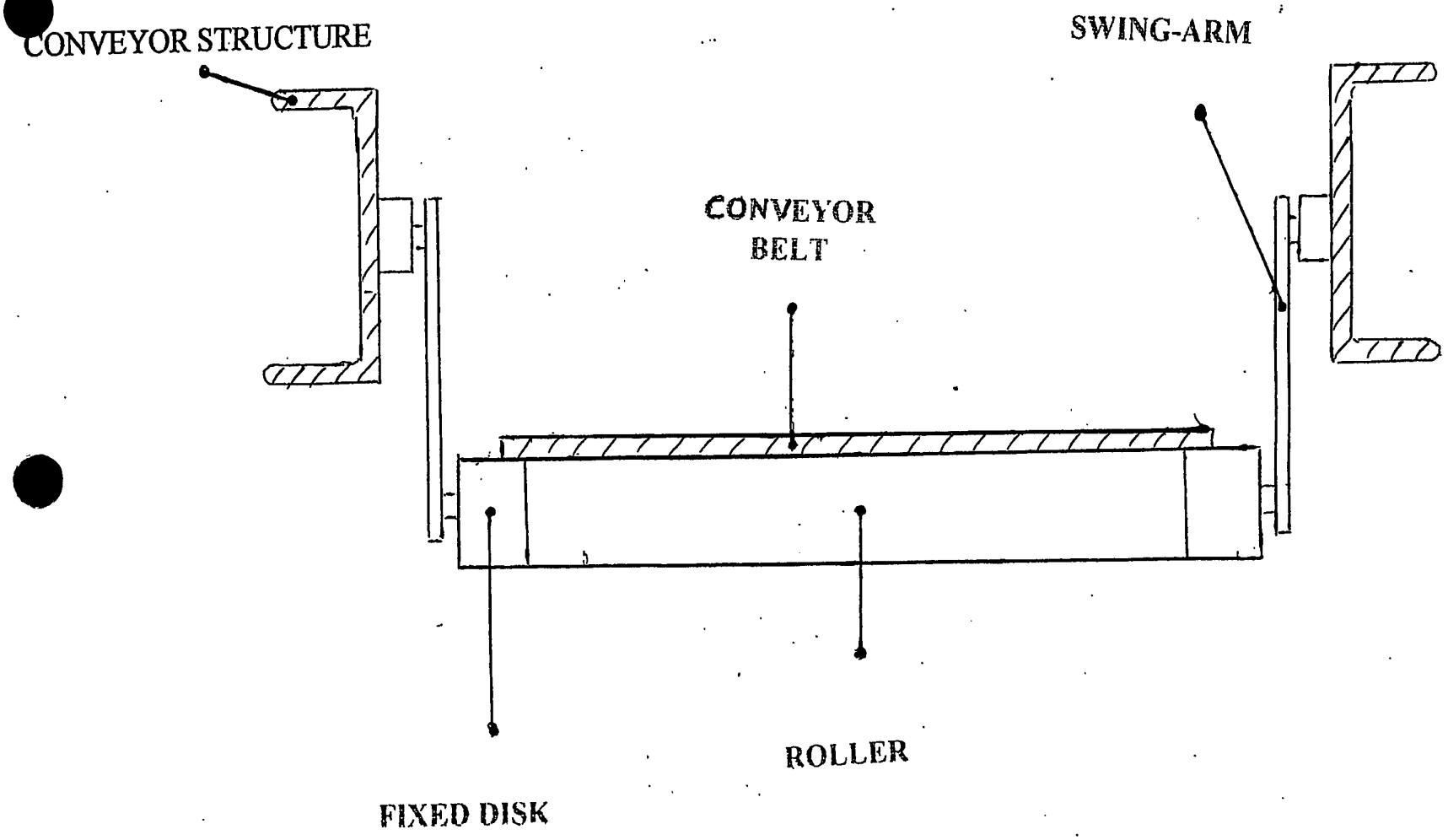

CONVEYOR STRUCTURE
SWING-ARM
CONVEYOR
BELT
ROLLER
FIXED DISK

FIG. 2a

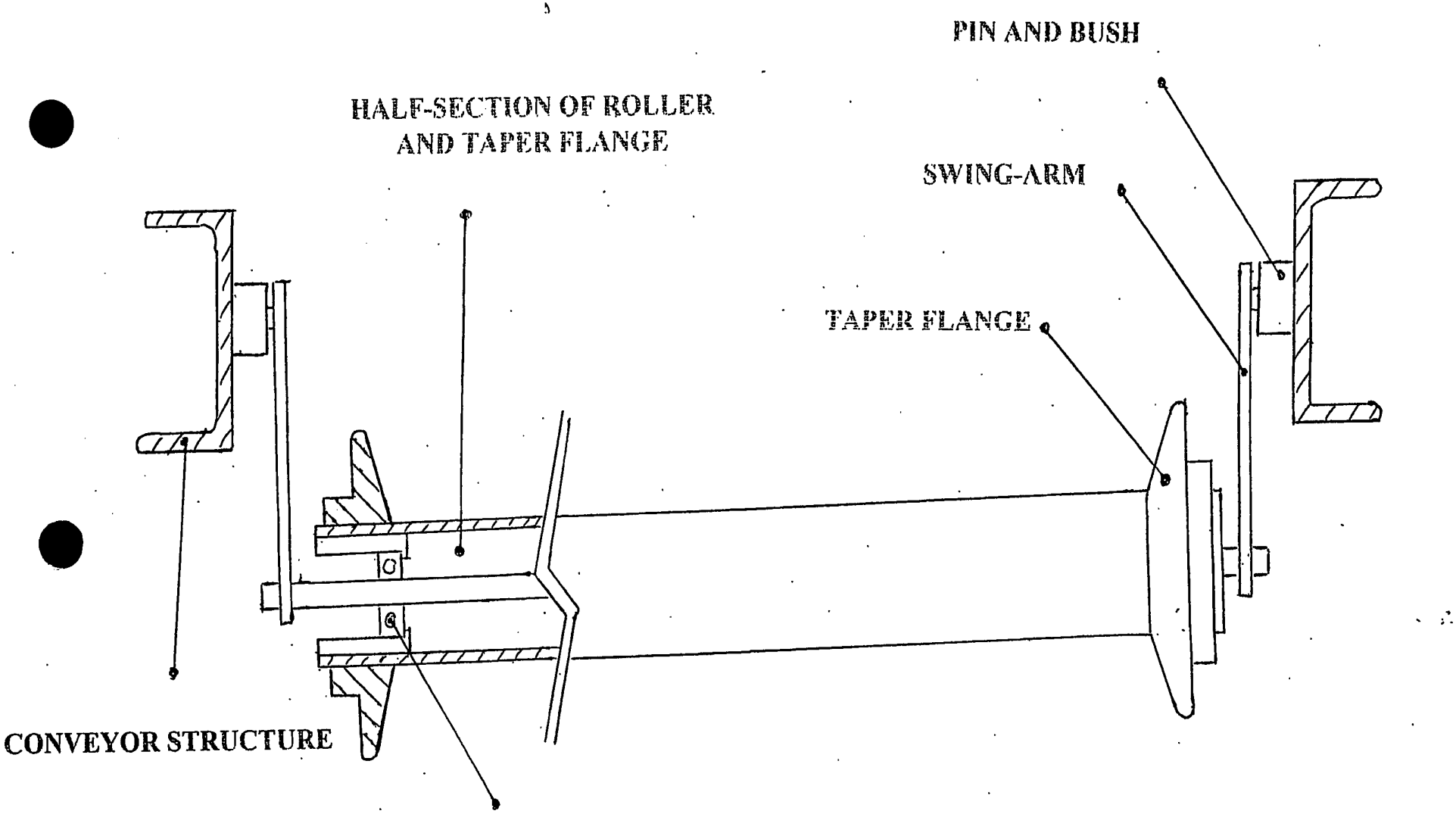

PIN AND BUSH
HALF-SECTION OF ROLLER
AND TAPER FLANGE
SWING-ARM
TAPER FLANGE
CONVEYOR STRUCTURE

FIG. 3

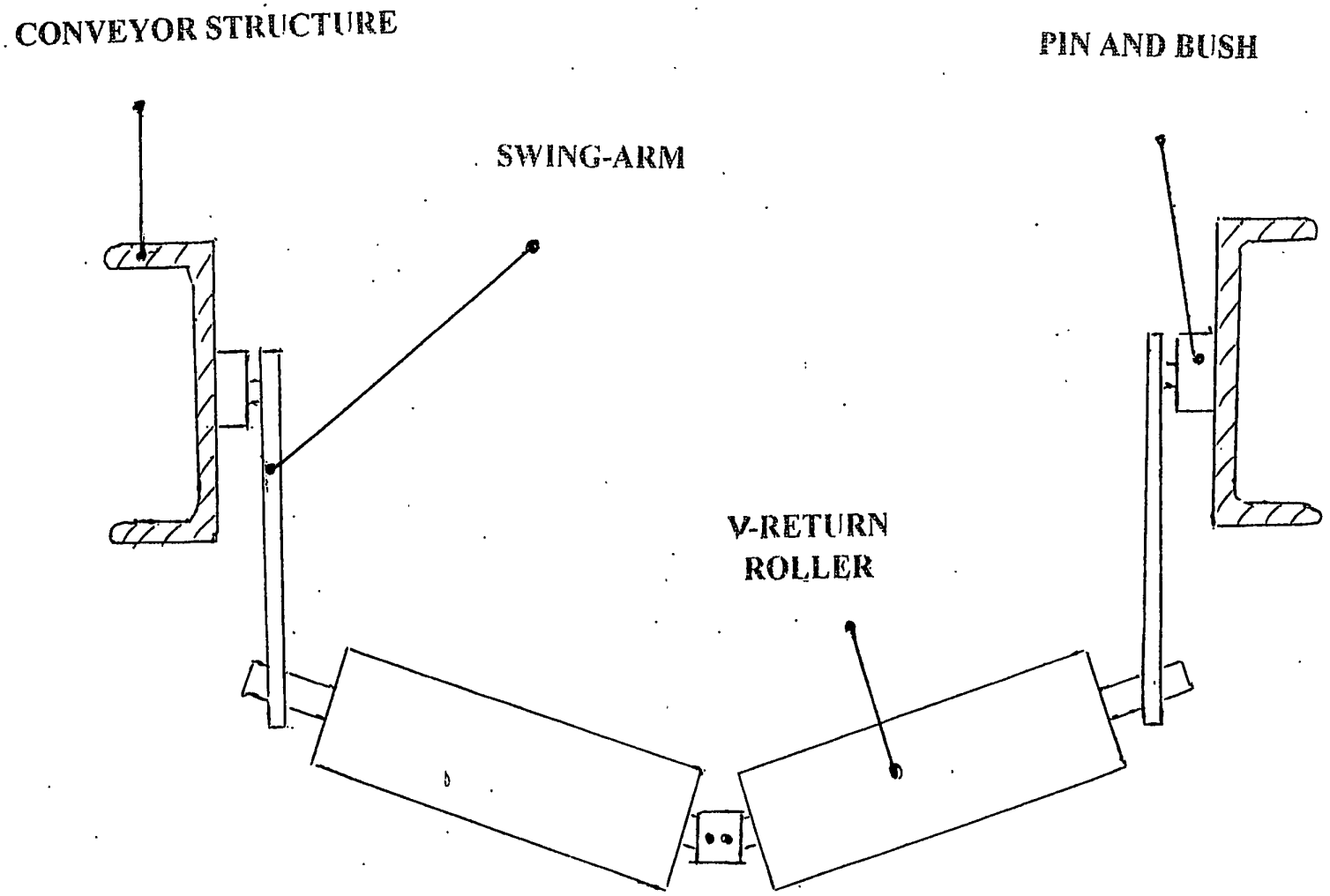


FIG. 4

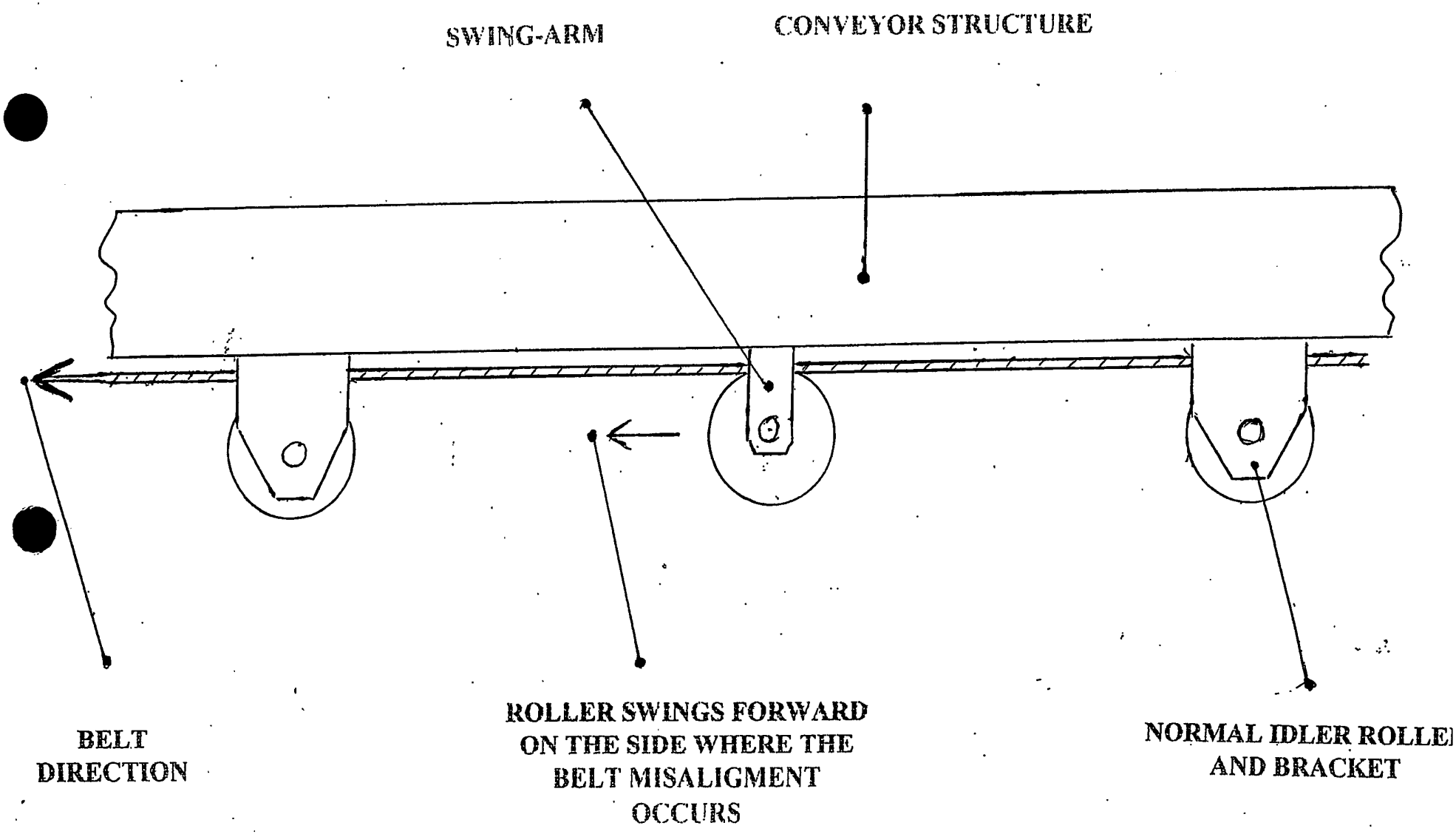

SWING-ARM
CONVEYOR STRUCTURE
BELT DIRECTION
ROLLER SWINGS FORWARD ON THE SIDE WHERE THE BELT MISALIGMENT OCCURS
NORMAL IDLER ROLLE
AND BRACKET

FIG. 5

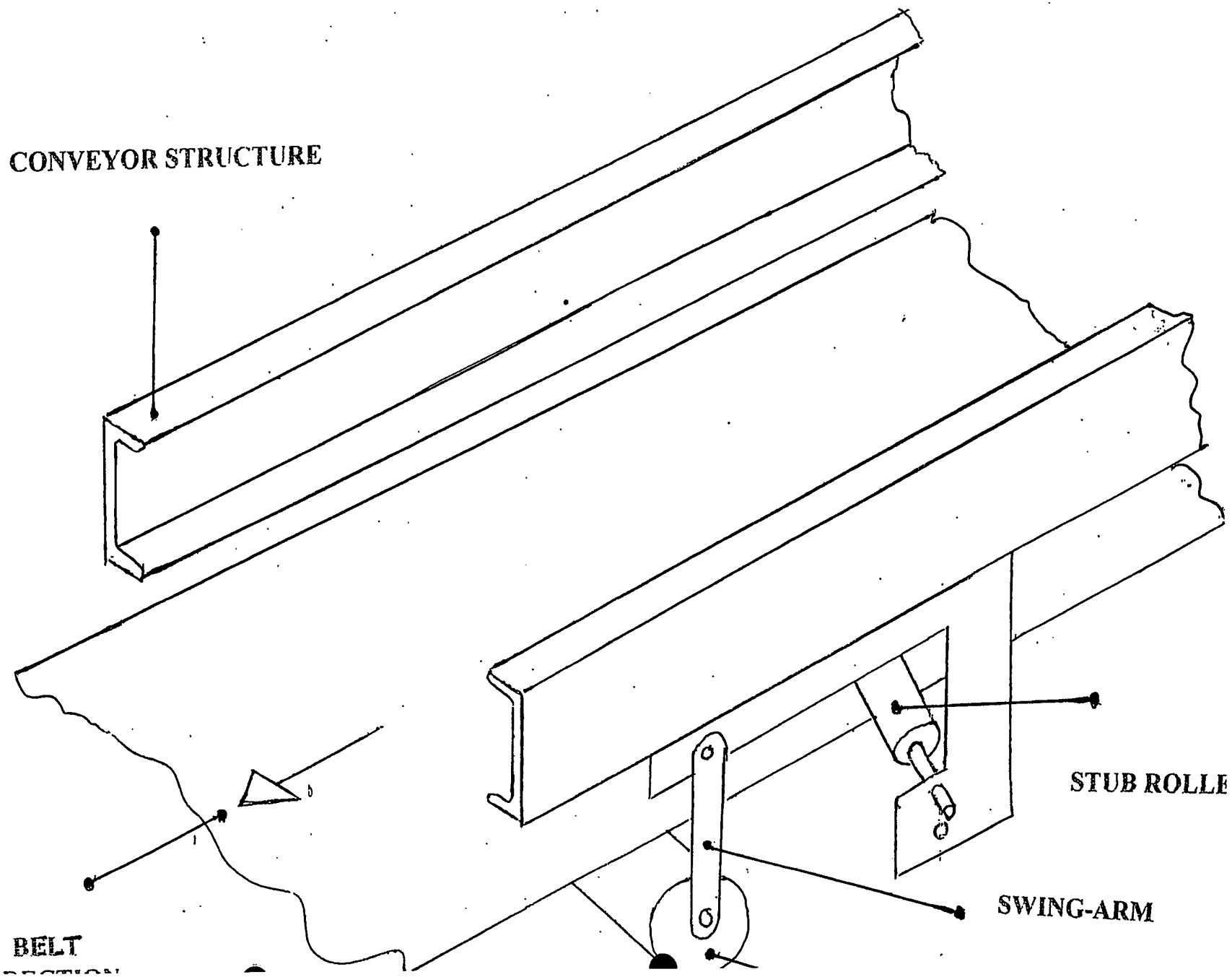


FIG. 6

CONVEYOR STRUCTURE

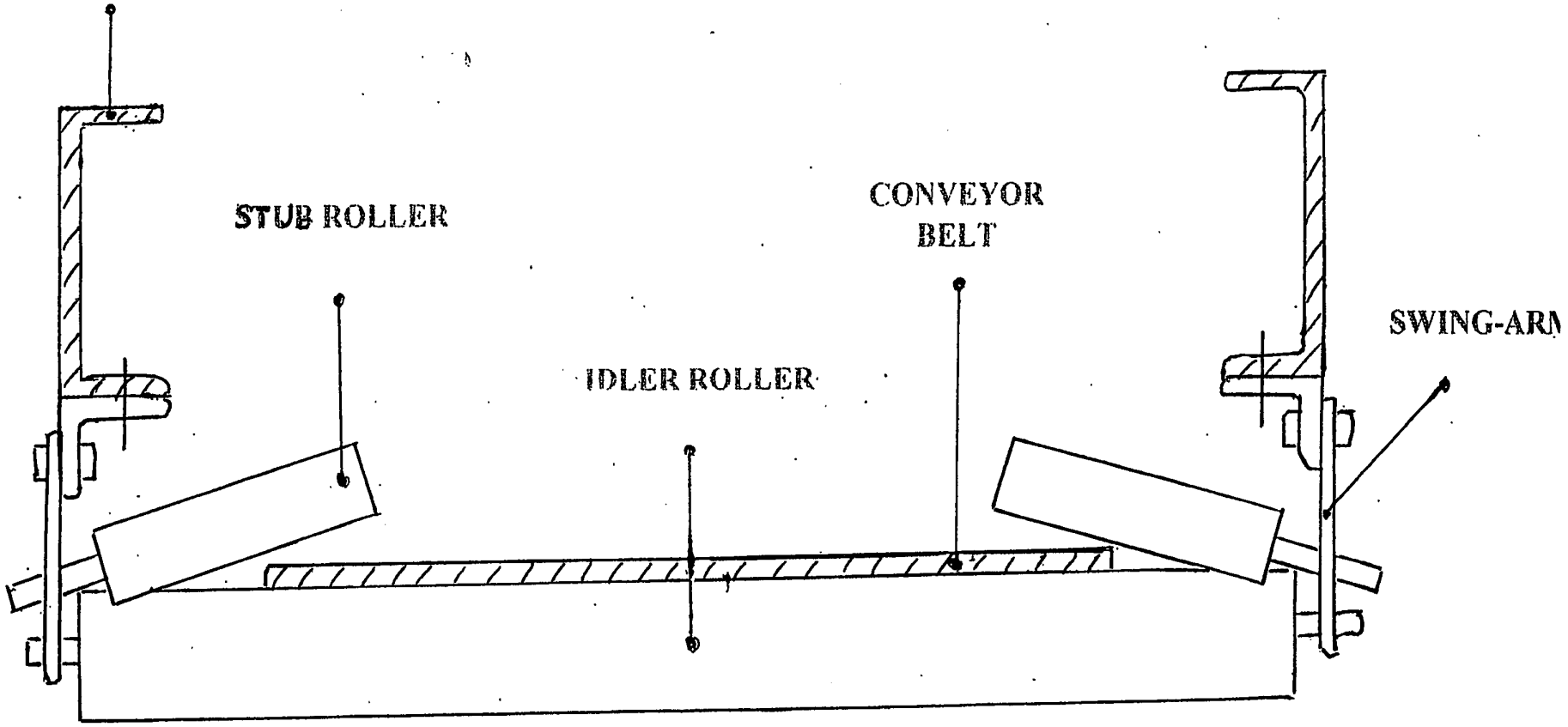


FIG. 7

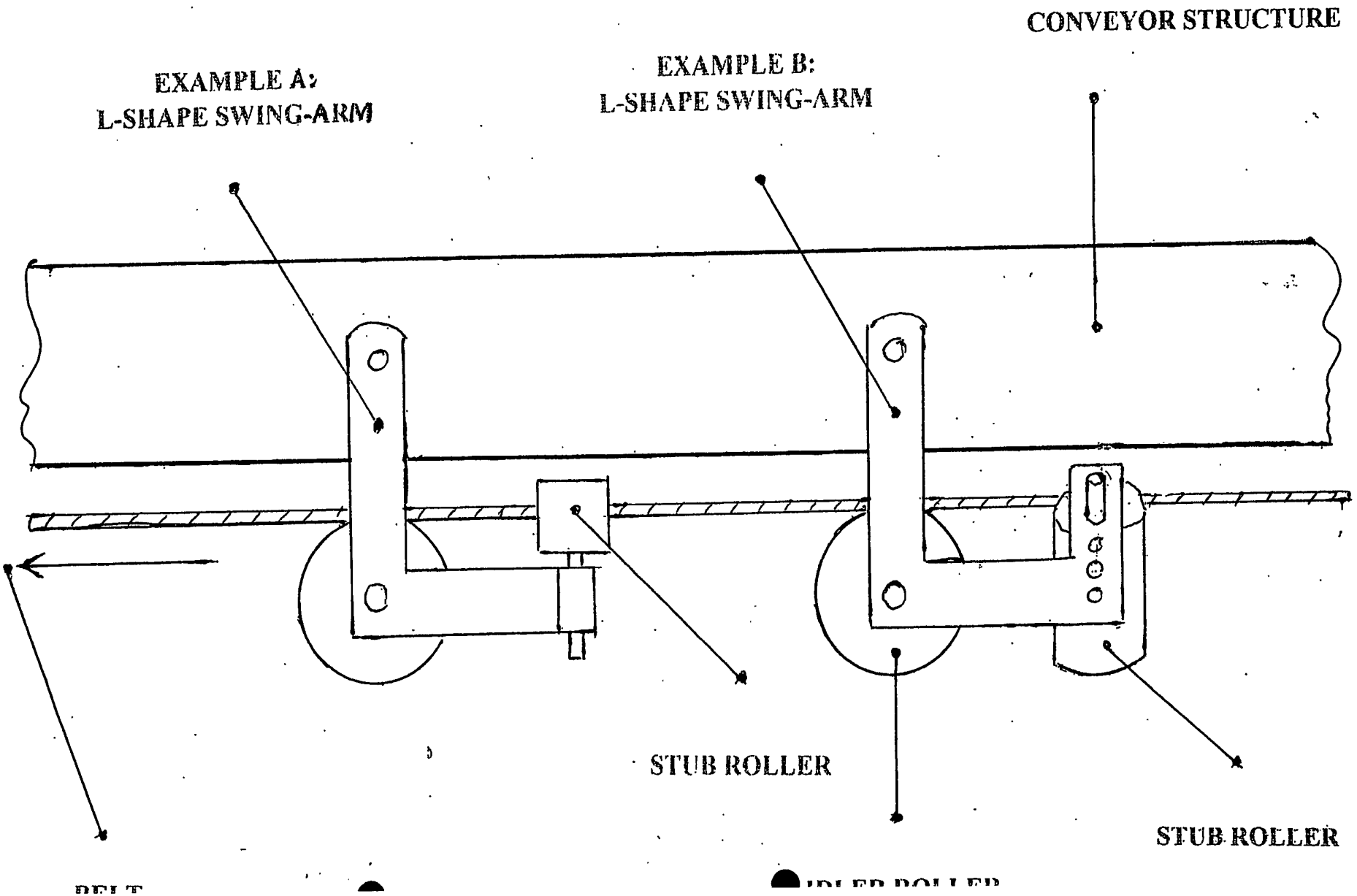

CONVEYOR STRUCTURE
EXAMPLE A:
L-SHAPE SWING-ARM
EXAMPLE B:
L-SHAPE SWING-ARM
STUB ROLLER
STUB ROLLER

FIG. 8

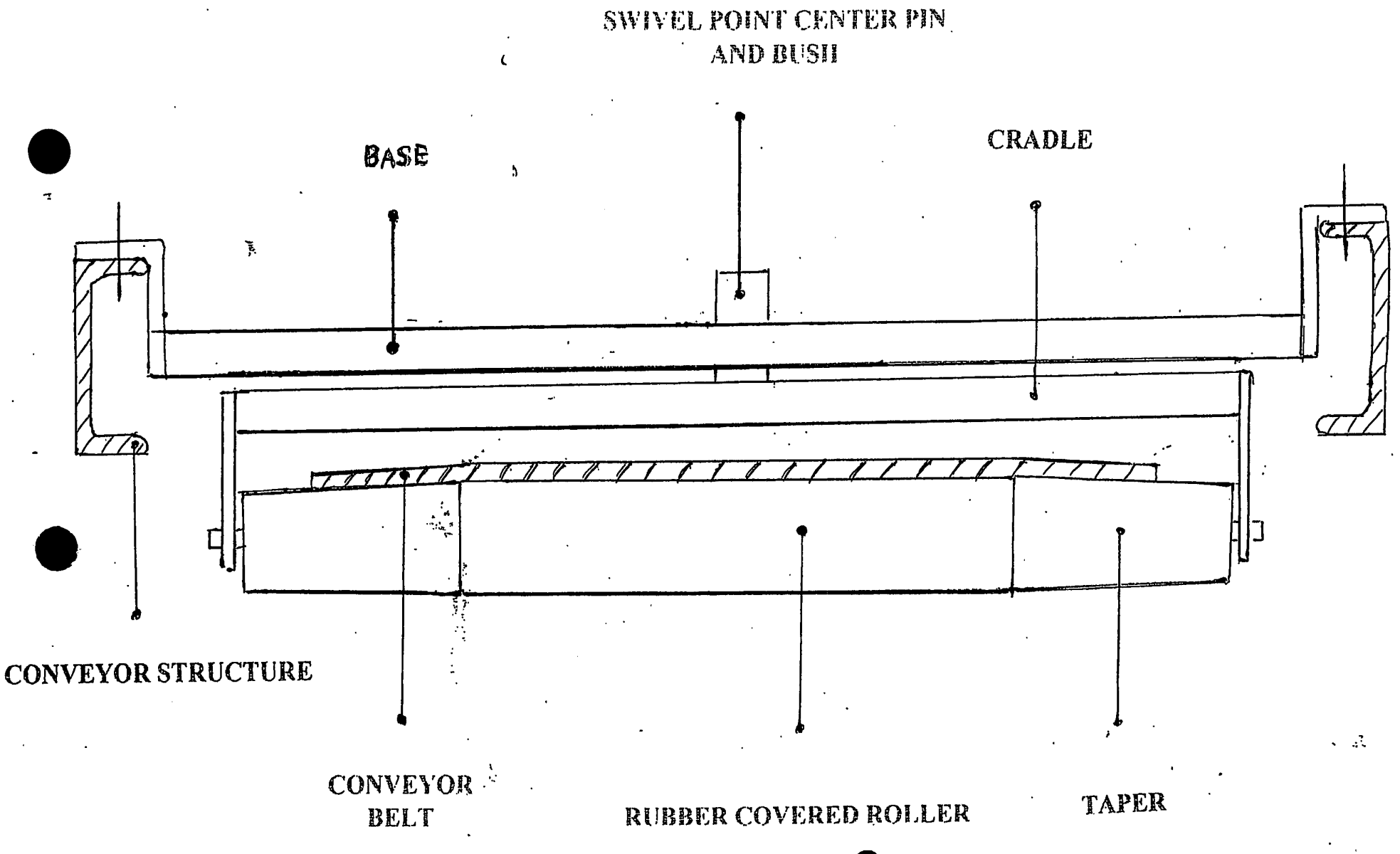

SWIVEL POINT CENTER PIN
AND BUSH
BASE
CRADLE
CONVEYOR STRUCTURE
CONVEYOR
BELT
RUBBER COVERED ROLLER
TAPER

FIG. 9

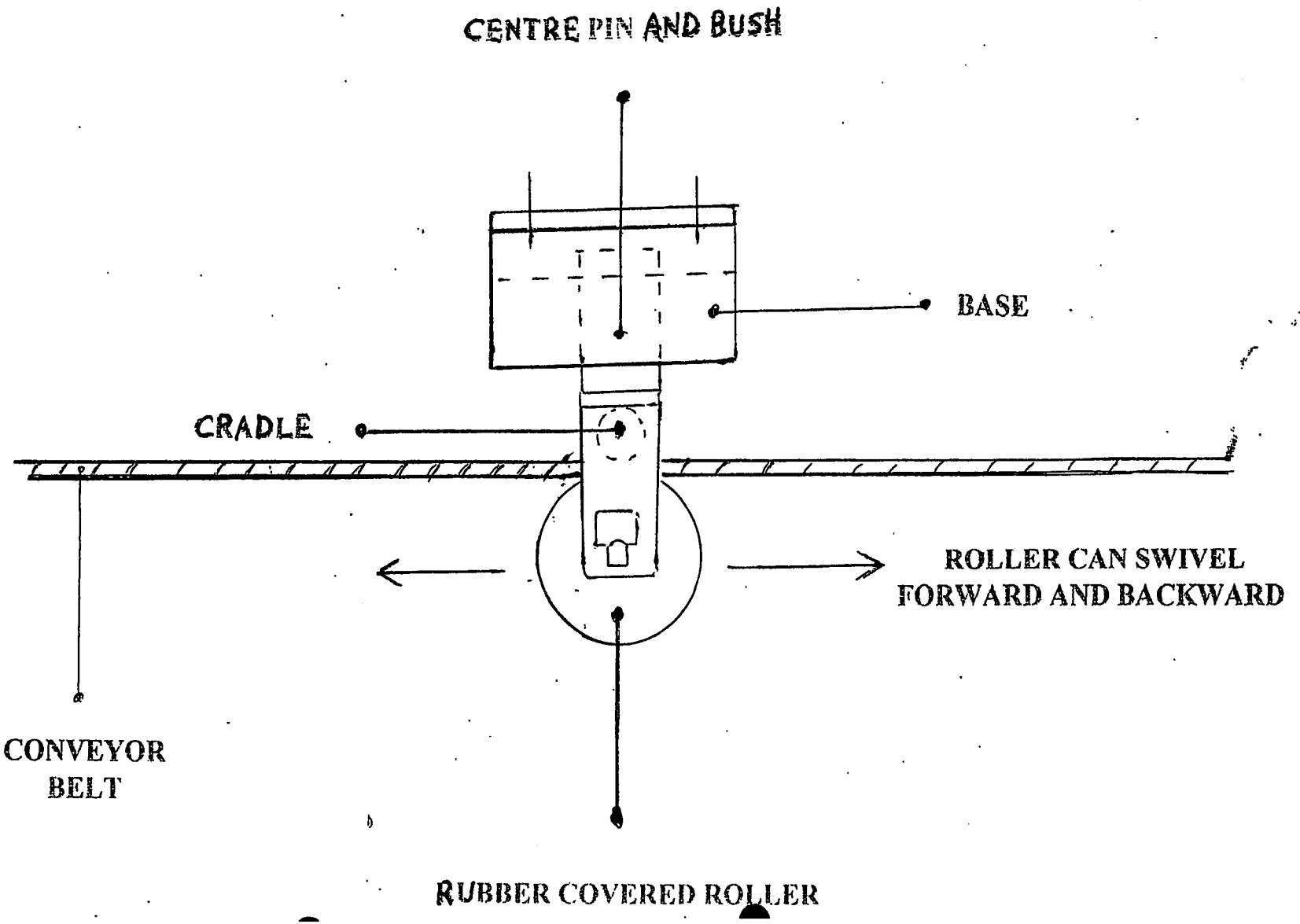

CENTRE PIN AND BUSH
BASE
CRADLE
ROLLER CAN SWIVEL
FORWARD AND BACKWARD
CONVEYOR
BELT
RUBBER COVERED ROLLER

FIG. 10

BASE AND CRADLE

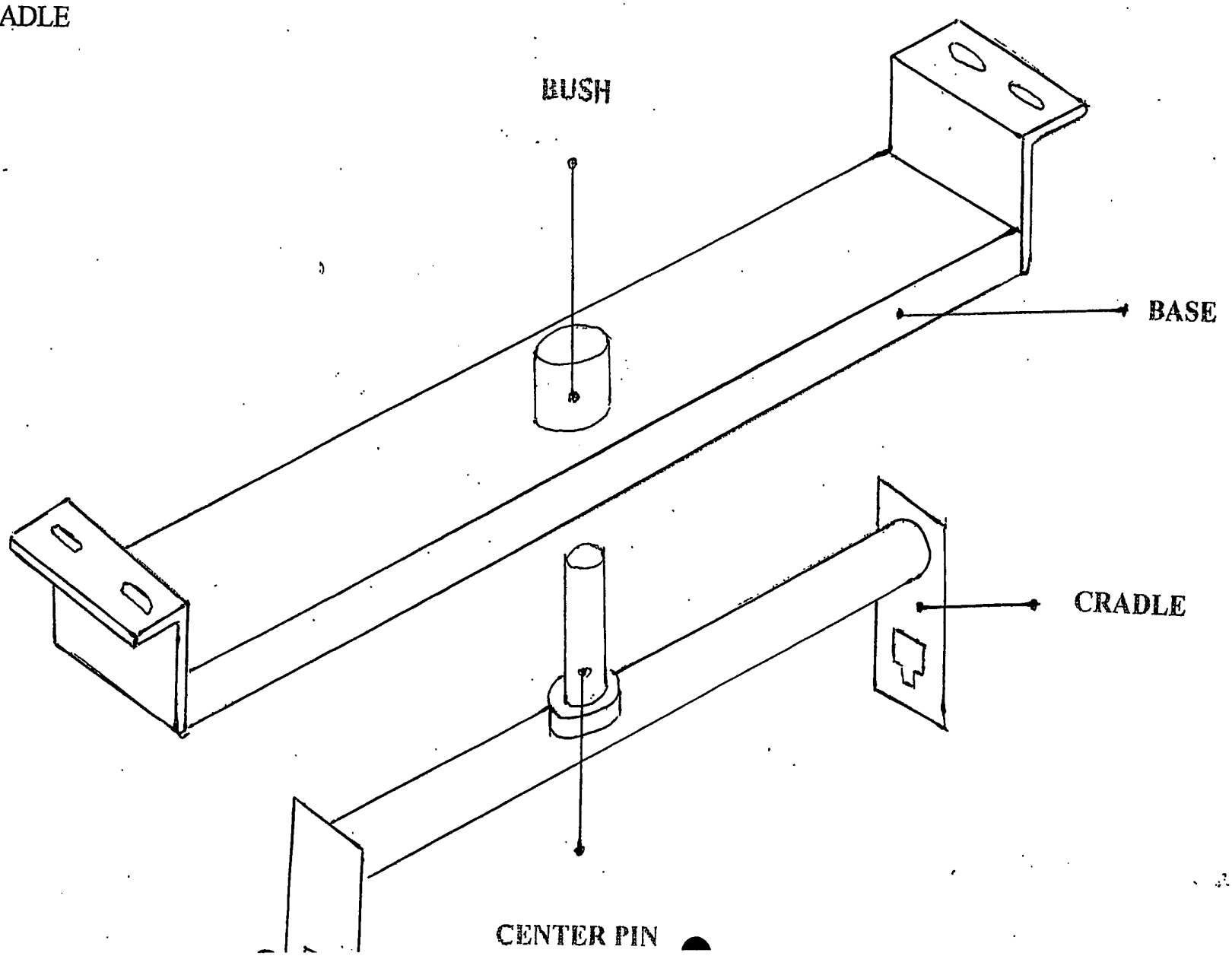


FIG. 11

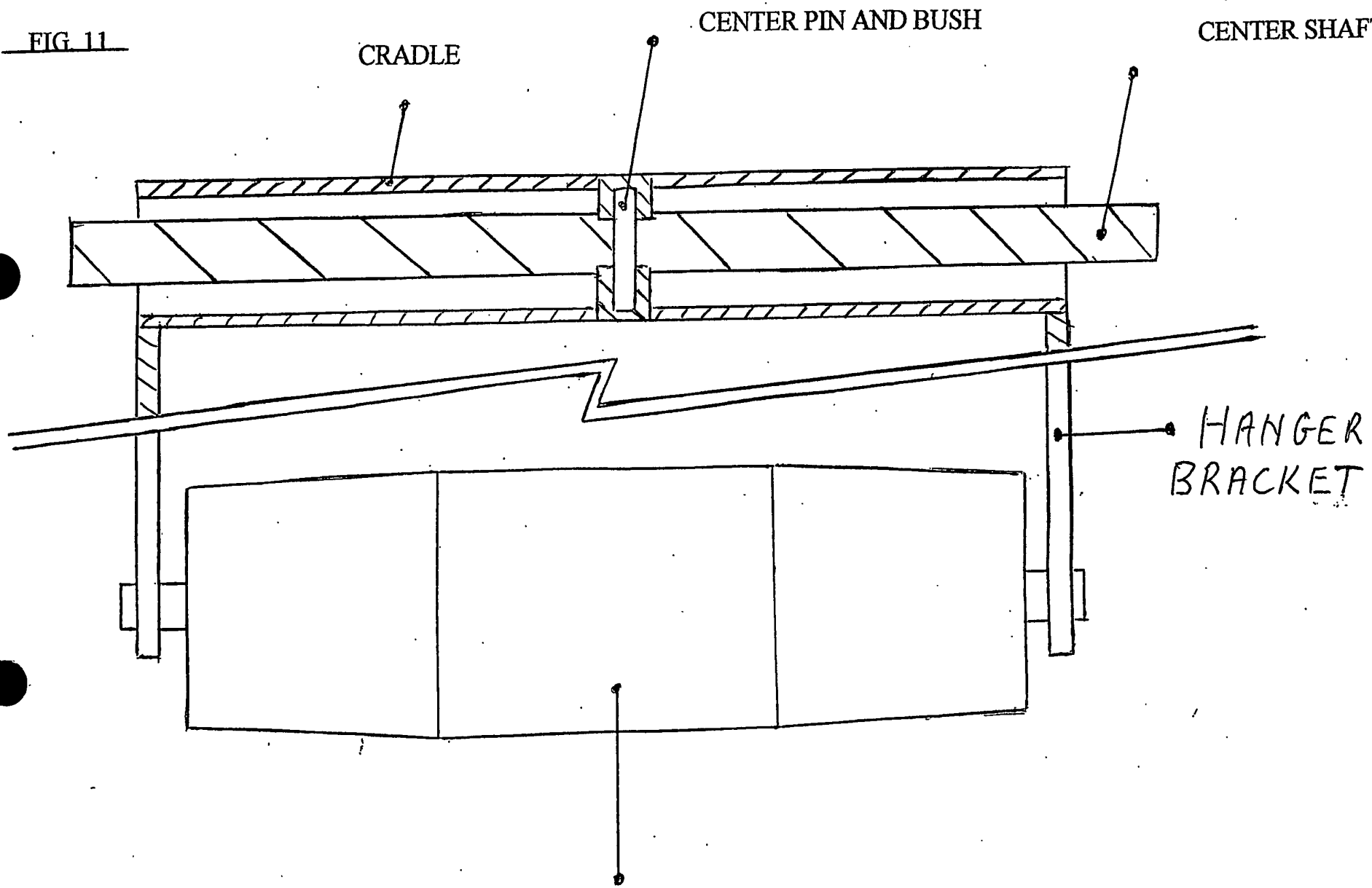
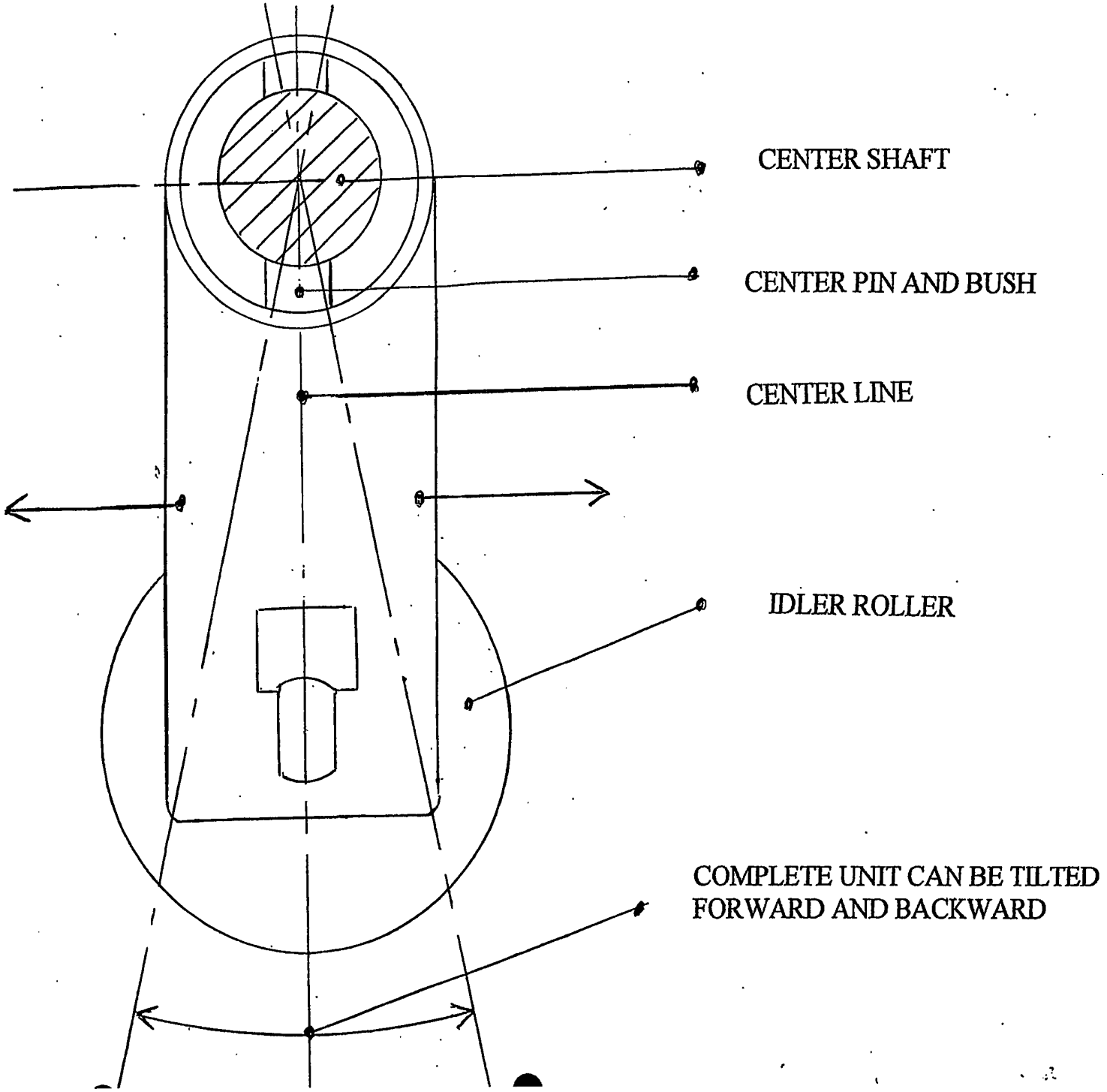
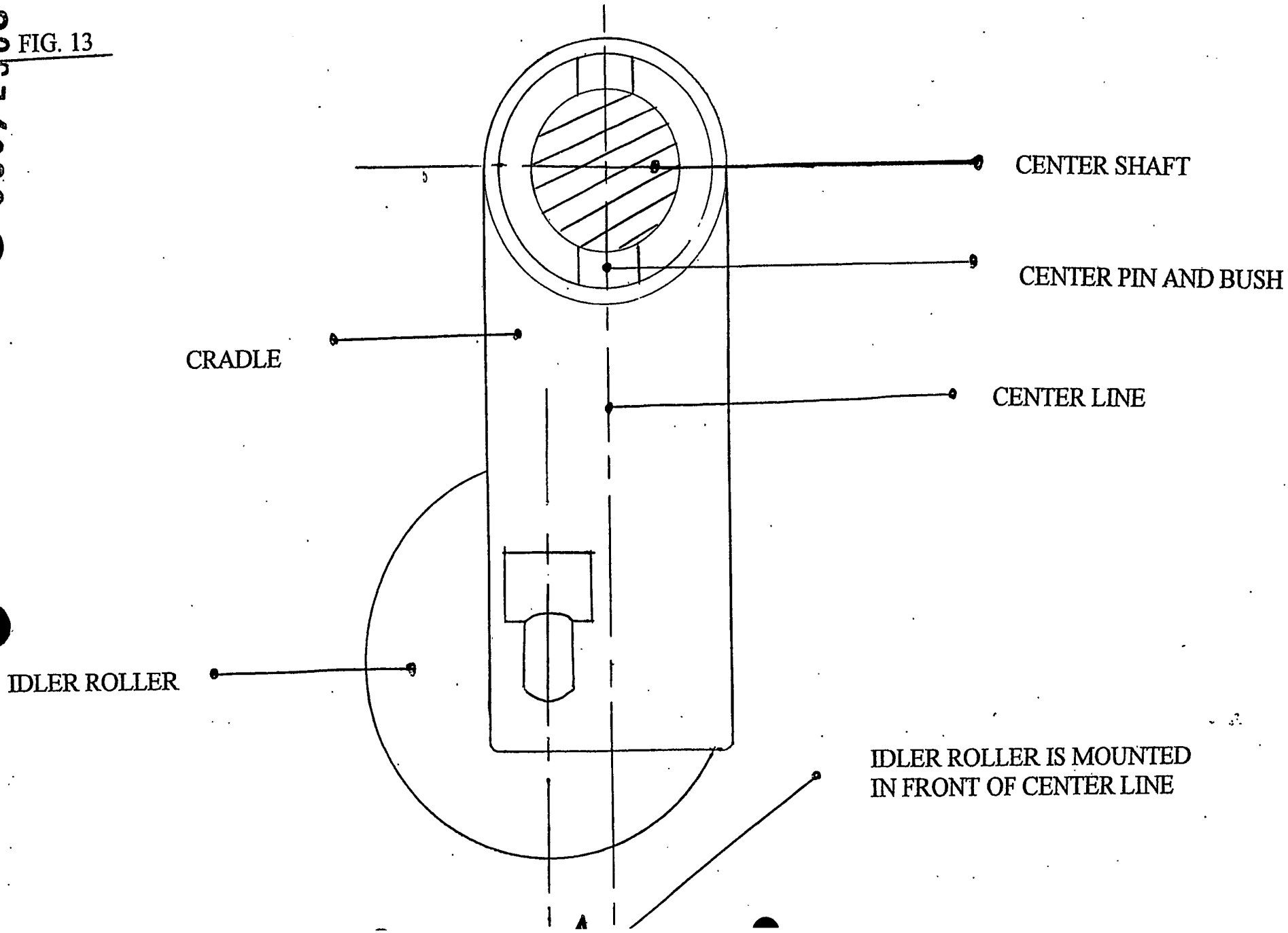

CRADLE
CENTER PIN AND BUSH
CENTER SHAFT
HANGER BRACKET
IDLER ROLLER

FIG 12


CENTER SHAFT
CENTER PIN AND BUSH
CENTER LINE
CRADLE CAN SWIVEL ON
CENTER PIN AND BUSH
IDLER ROLLER
COMPLETE UNIT CAN BE TILTED
FORWARD AND BACKWARD

2003/23688

FIG. 13



This Page is Inserted by IFW Indexing and Scanning Operations and is not part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☑ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☑ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☑ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.
As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.